IDENTIFYING DATA GAPS

EPA Tribal Watershed Planning Workshop
Billings, Montana – September 12-14, 2006

Items for Discussion

- Definition of a data gap
- What is the purpose of assessing data gaps?
- What is the process of assessing data gaps?
- Talk will focus on water quality
- Other types of data are also important to you such as sediment, water quantity, and biological data
- Concepts discussed today are equally valid for all types of data

Definition of Data Gaps

- Any missing data that impairs your ability to meet your project goals
- Historical data collected by other projects at other times
- A review of data you are currently collecting or are considering collecting
- Is my data the right type and collected with sufficient frequency and at the needed number of locations to address my water quality issues?

Types of Data Gaps

- Informational
- Temporal
- Spatial
- Data Quality

Purpose of Assessing Data Gaps

- Is new or additional data collection needed?
- If so helps you to decide on sampling effort needed for current project
- Can save money, time, and effort
- Use your resources as efficiently as possible

Process of Assessing Data Gaps

- Review of historical data - Where do you look for information you need?
- Review of project proposals (SAPS and QAPPS for proposed or ongoing projects) – are you collecting the correct type of data at the times and locations you need to satisfy project objectives?

Informational

- Assessing the type and amount of data available for your watershed
- What are your objectives – water quality, water quantity, biological?
- What information do your currently have?
- Where do you look for information you need?

Water Quality – Supporting Data

- Weather – National Climate Data Center (http://www.ncdc.noaa.gov/oa/ncdc.html)
- Land Use/Land Cover – USGS Land Cover Institute (LCI)
- LCI - http://landcover.usgs.gov

Water Quality – Supporting Data

- Soils – NRCS - STATSGO and SSURGO
  - (http://www.ncgc.nrcs.usda.gov/products/datasets/statsgo/)
  - (http://www.ncgc.nrcs.usda.gov/products/datasets/ssurgo/)
- County Soil Surveys

Water Quality – Supporting Data

- Bedrock Geology – USGS Publication Warehouse (http://infotrek.er.usgs.gov/pubs/)
- State Geological Surveys

Water Quality Data

- Federal Agencies – USGS (www.usgs.gov), EPA (www.epa.gov), and USFS (www.fs.fed.us)
- State Agencies – State Health Departments or Environmental Conservation Departments
- Universities/Colleges – Master or PhD studies
- Studies done by consulting firms

Water Quantity – Surface Water

- Current and historical streamflow data – USGS and State Environmental Departments
- Reservoirs – water levels and volume of water releases – U.S. Bureau of Reclamation (www.usbr.gov)

Water Quantity - Groundwater

- Water levels and aquifer type – USGS, State Engineers Office, Local Drilling Contractors
- Geologic Maps – USGS and State Geologic Surveys
- Hydrogeologic Reports – USGS, consulting firms

Biological

- U.S. Fish and Wildlife Service (www.fws.gov)
- USGS NAWQA Program
- Master's theses and Doctoral dissertations

Temporal Data Gaps

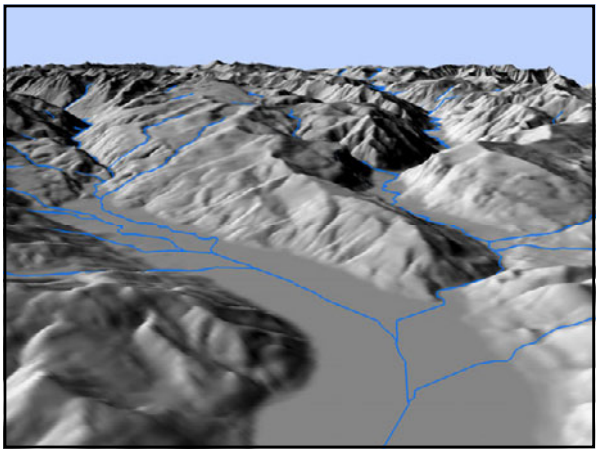
- Does the historical data or data that you are currently or planning on collecting bracket the expected range of seasonally variability in weather, stream flows, and human activity within the watershed over the course of a year?

Spatial Data Gaps

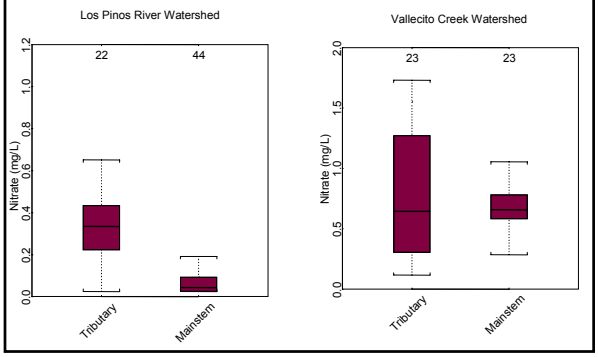
- Does the historical data or data that you are currently or planning on collecting bracket the suspected sources of pollution in your watershed?

Does a Data Gap Exist?

- Problem – You want to know if sampling the mouth of a large watershed is representative of the watershed as a whole – watershed characterization
- Need – Data from major tributaries, main channel sites downstream from tributaries, bracket changes in land use and geology



Nitrate



Does a Data Gap Exist?

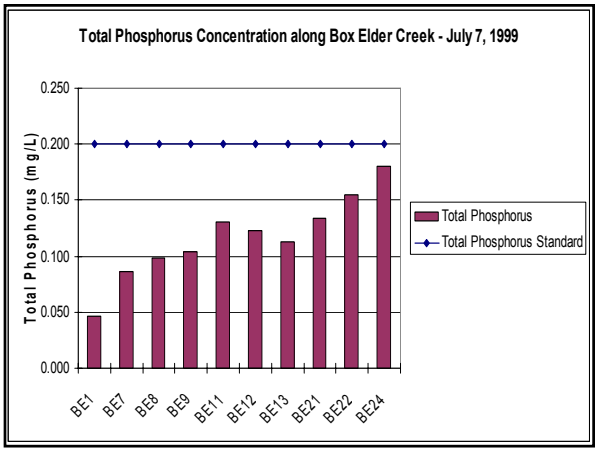
- Problem – Need to determine if a water quality standard is violated
- Need - Data to establish the variation in the concentration to be expected at a site or sites – how often is the standard exceeded?
- Need – Do you have the QC data to determine if a violation is significant – especially important if violation is close to the standard concentration

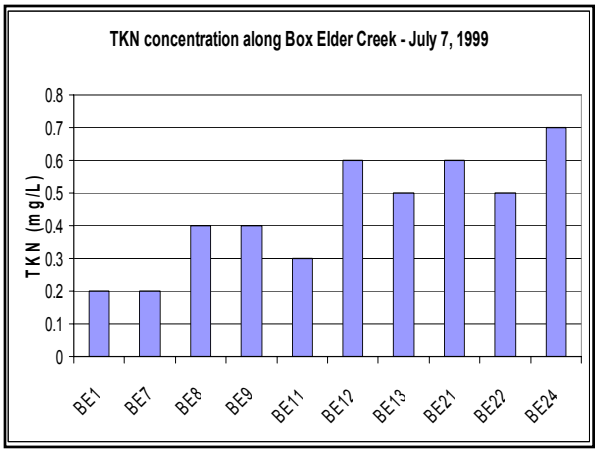
Does a Data Gap Exist?

- Problem – Want to establish the effectiveness of a BMP in reducing non-point source pollution adjacent to a river reach
- Need – Data collected from upstream and downstream of stream reach that brackets the BMP over a variety of flows

Does a Data Gap Exist?

- Problem – Want to identify the sources of phosphorus to a river
- Need – Data collected upstream and downstream of all possible sources of phosphorus (agricultural fields, cattle feed lots, residential areas with septic tanks) over a range of flows (How does phosphorus loading vary with flow?)





Does a Data Gap Exist?

- Problem - You want to restore an impaired stream reach to its pre-disturbance condition
- Need – Data collected from the impaired reach before the disturbance occurred. If it does not exist you will need to sample other stream reaches with similar characteristics

Does a Data Gap Exist?

- Problem – You want to know if a point or non-point source of pollution is affecting groundwater quality
- Need – Data on the geology (stratigraphy) of the area, hydraulic conductivity of major aquifers, water levels, chemistry of groundwater upgradient and downgradient of pollution source, and depth of well and geologic formation where the well screen is located

Data Quality is Important!

- Use of any data depends on the existence of the documentation of data quality.
- Use the following questions to guide your assessment of historic data and data you are currently collecting or planning on collecting.

Data Quality

- Are sample collection locations documented (names and latitude and longitude)?
- Are dates and times reported?
- Are field and laboratory methods documented?
- Is there a streamflow measurement associated with a sample?

How to Sample

- Grab or dip sampling with an open bottle
- Equal-width-increment (EWI) method
- Equal-discharge-increment (EDI) method

Grab or dip sampling with an open bottle

- When sample integrity would be affected by other sampler materials
- When sediment is not important to the analysis
- When there is no vertical stratification in the constituents of interest
- When minimum flow conditions (i.e. velocity and depth of stream) for using other samplers are not met.

Stream Mixing

Poor lateral mixing is typically a problem downstream from tributaries and point-sources of pollutants.

Would a grab sample in the larger river be representative of the entire stream cross section here?

EWI Sampling

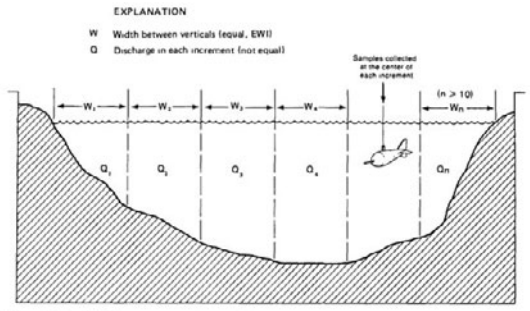


Figure 36. Equal-width-increment sampling technique.

Sampler lowered and raised at constant transit rate.
Volume in each bottle proportional to incremental discharge.

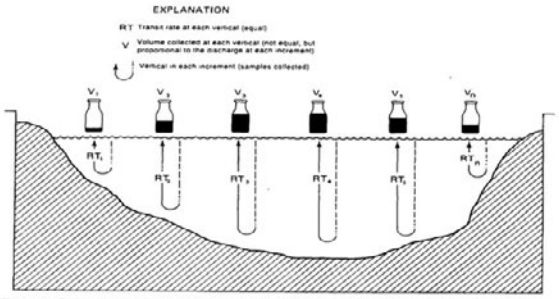


Figure 37. Equal-width-increment vertical transit rate relative to sample volume, which is proportional to water discharge at each vertical.

Particulates

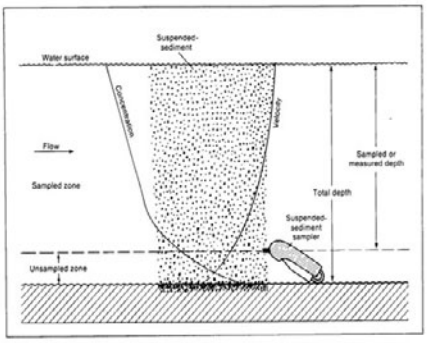


Figure 1. Sampled and unsampled zones in a stream sampling vertical, with respect to velocity of flow and sediment concentration.

Vertical stratification is typical for particulates and particulates associated pollutants

USGS Publications

- Wilde, F.D., and Radtke, D.F., 1998, National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chap. A4, variously paged.
- http://infotrek.er.usgs.gov/pubs/

USGS Publications

- Techniques of Water-Resources Investigations (TWRI)
- Book 3 Chapter C1, (Guy, 1970) **Fluvial Sediment Concepts**.
- Book 3 Chapter C3, Porterfield, (1972) **Computation of Fluvial-Sediment Discharge**.

Data Quality

- Is there a distinction between the dissolved and total forms of the parameter (nutrients and metals)?
- Is the form of the parameter clearly reported? Example: NO_3 as N in mg/L or NO_3 in mg/L
- Are the concentration units reported?
- Is the cation/anion balance acceptable?

Data Quality

- Are the total concentrations greater than the dissolved concentrations (nutrients and metals)?
- Were field blanks collected and analyzed (estimate of bias or contamination)?
- Were field duplicates collected and analyzed (estimate of reproducibility)?

Data Quality

- Pesticides – Do you need concentration data for breakdown products, matrix spikes, or % recovery data?
- Field Parameters – Was the instrument calibrated each day of use? Consider the use of standard reference samples of pH and specific conductance.